UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/685,534	10/10/2000	Xuedong Huang	M61.12-0316	3998

7590 09/22/2004

Theodore M. Magee
c/o WESTMAN, CHAMPLIN & KELLY, P.A.
International Centre - Suite 1600
900 Second Avenue South
Minneapolis, MN 55402-3319

EXAMINER	
HAN, QI	
ART UNIT	**PAPER NUMBER**
2654	9

DATE MAILED: 09/22/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Application No.	Applicant(s)
09/685,534	HUANG ET AL

Office Action Summary

Examiner	Art Unit
Qi Han	2654

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-29* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-22,27 and 29* is/are rejected.

7)☒ Claim(s) *5,7-14,16-18,20 and 23-28* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *10 October 2000* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Specification and Drawing

1. The disclosure is objected to because of the following:

a. On page 20, lines, applicant recites "The test signal and the training signals are then modified by adding properly adjusted noise segments to each signal so that the mean and variance of each frequency component in the modified signals are equal to the maximum mean and maximum variance found in either signal", which is incorrect, because the maximum mean and maximum variance of the two signals include speech and noise mixed signal contributions, and they are, in general, not equal. Appropriate correction is required.

b. The sentences of "the **variance of the noise** in the training signal is determined" (page 22, lines 5-7), "**the variance of the frequency component in the noise** of the test in the training signal is determined" (page 23, lines 4-6), and "σ^2_{train} is the **variance in the training signal**, σ^2_{test} is the **variance in the test signal**, and σ^2_{noise} is **the variance of the values** in the zero-mean noise segment produced at step 708" (page 26, lines 3-8, including equation 1, also comparing the steps in Fig. 7), are inconsistent or miss-described, which is not only incorrectly defined for the mathematical terms but also cause a lot of confusions. To avoid vagueness and confusion, applicant should clearly and consistently describe and/or define the terms in the application, particularly, for the different meanings of **means and variances** in the specification. When refereeing one of these terms, applicant must distinguish the different conditions in: (a) a noise segment of a signal, (b) an equivalent noise effect of a signal, or (c) a speech and noise mixed signal,

since they are critical for understanding and using the claimed invention. It is also noted that applicant should clearly indicate when a calculated value is added, when a noise segment is added, and when a noise segment is extended to an entire signal, but applicant fails to do so. Appropriate correction is required.

2. Concerning multiple errors found in the application, the lengthy specification has not been checked to the extent necessary to determine the presence of all possible minor errors. Applicant's cooperation is requested in correcting any errors of which applicant may become aware in the specification.

3. If there are too much places to be amended, since the terms of "mean" and "variance" and their related descriptions are spread around the whole specification and claims, examiner suggests to consider a substitute specification pursuant to 37 CFR 1.125(a).

A substitute specification must not contain new matter. The substitute specification must be submitted with markings showing all the changes relative to the immediate prior version of the specification of record. The text of any added subject matter must be shown by underlining the added text. The text of any deleted matter must be shown by strike-through except that double brackets placed before and after the deleted characters may be used to show deletion of five or fewer consecutive characters. The text of any deleted subject matter must be shown by being placed within double brackets if strike-through cannot be easily perceived. An accompanying clean version (without markings) and a statement that the substitute specification contains no new

matter must also be supplied. Numbering the paragraphs of the specification of record is not considered a change that must be shown.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

4. Claims 1-14, 15-20, and 27 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Regarding claim 1, the claimed limitation of:

"generating a matched test signal and a matched training signal by performing steps for each of a plurality of frequency components, the steps comprising:

> adding to the strength of the frequency component in one of the test signal or training signal as part of the production of the matched test signal and matched training signal so that the mean strength of the frequency component of noise in the matched test signal matches the mean strength of the frequency component of noise in the matched training signal"

is indefinite because (a) the "generating" step suggests performing multiple sub-steps, but it appears only one "adding to" sub-step, and other sub-steps are missing; (b) the phrase "as part of the production of the matched test signal **and** matched training signal" is unclear and/or logically conflict with "adding to the strength ... in **one of** the test signal **or** training signal" training. This also appears to miss some other sub-steps that relates to issue (a). As best understood, this limitation will be interpreted as "generating a matched

test signal and a matched training signal by performing a step for each of a plurality of frequency components, adding to the strength of the frequency component in one of the test signal or training signal so that the mean strength of the frequency component of noise in the matched test signal matches the mean strength of the frequency component of noise in the matched training signal".

Regarding claims 2-14, they depend on claim 1 so that they inherit all the limitations of claim 1, including the rejected limitation(s) stated above.

Regarding claim 15, the claimed limitation of "so that **the variance of the frequency component** is matched in a matched training speech signal and a matched test speech signal" is unclear and/or indefinite because there is no indication that whether terms of "the variance of the frequency component" is a variance of a noise segment in the signals, a variance of the frequency component of the noise portion in the signals, or a variance of the frequency component of mixed speech and noise in whole signals. Since the term "variance" is not the term commonly used for noise distribution in time domain, applicant should clearly define and/or describe them, and distinguish the differences between different conditions and/or situations whenever the recitations may possibly cause confusion. Further, this issue is directly related to the disclosure objection (see above), so that the specification should be clarified first. As best understood, the limitation is will be interpreted as "so that the variance of the frequency component **of noise** in a matched training speech signal matches the variance of the frequency component **of noise** in a matched test speech signal", hereinafter.

Regarding claims 16-20, they depend on claim 15 so that they inherit all limitations of claim 15, including the rejected limitation(s) as stated above.

Regarding claim 18 (depending on claim 15), it further includes the limitation of "the mean strength of the frequency component", which has similar problem as describe for claim 15 (see above).

Regarding claim 19 (depending on claim 15), it further includes the limitation of "the largest variance", which has similar problem as describe for claim 15 (see above).

Regarding claim 20 (depending on claim 15), it further includes the limitation of "the variance of strength values of the frequency component", which has similar problem as describe for claim 15 (see above).

Regarding claim 27 (depending on claim 24), the rejection is based on the same or similar reason as describe for claim 15, because the limitation of "the variance of strength values of the frequency component" has similar problem as describe for claim 15 (see above).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

5. Claims 1, 3-4, 21 and 29 are rejected under 35 U.S.C. 103(a) as being unpatentable over Porter (US Porter (US 4,933,973), in view of Maes (US 5,930,749).

As per **claim 1**, as best understood in view of the rejection under 35 USC 112 2nd (see above), Porter discloses apparatus and methods for the selective addition of noise to templates employed in automatic speech recognition systems (title), comprising:

generating a matched test signal (herein corresponding to incoming signal) and a matched training signal (herein corresponding to generated templates) by performing step for each of a plurality of frequency components (spectral magnitude values of utterance) (column 4, lines 10-21),

> adding to the strength of the frequency component in one of the test signal or training signal so that the mean strength of the frequency component of noise in the matched test signal matches the mean strength of the frequency component of noise in the matched training signal (column 4, lines 10-21, 'spectral magnitude values (strength of the frequency component)'; column 5, line 15 to column 6, line 54 and Figs. 1A and 1B, 'spectral parameter' (also corresponding to strength of the frequency component), 'selectively adds noise to form templates', 'modify (including "add to") the spectral templates (corresponding to training signal) as formed in module 164', 'templates ...are modified by the selective addition of noise via the estimated noise statistic generator'; column 8, lines 18-21, 'by modifying noise-free or relatively noise-free templates so that they are the same (inherently including the same mean strength) "as if" they had been made from noisier speech');

creating a model based on the matched training signal (column 7, lines 19-25, 'speech data from the training utterance is divided into segments...the segments belonging to the selected subset are used as templates (corresponding to model);and

applying the matched test signal to the model to produce the likelihood (column 7, lines 19-25, 'these segments are then applied as an input for a statistical clustering analysis which selects a subset of segments that maximizes a mathematical function (interpreted as the maximize likelihood) based on a measure of distance between the segments'; column 9, lines 1-2, 'probability (reflecting likelihood) distribution of the output of a signal').

But, Porter does not expressly disclose the likelihood that "a same speaker generated the training signal and the test signal". However, this feature is well known in the art as evidenced by Maes who discloses monitoring, identification, and selection of audio signal poles with characteristic behaviors, for separation and synthesis of signal contribution (title), comprising classifying background noise with different models (column 7, lines 27-45), generating log-likelihood of feature vectors and mean and variance (column 8, lines 52-55) and using a model selection 342 for speech or speaker recognition (in that the training signal and the test signal would be a same speaker) (column 9, lines 6-7 and 44-55). Therefore, it would have been obvious to one of ordinary skill in the art at time the invention was made to modify Porter by specifically providing a model for speaker recognition, taught by Maes, for the purpose of offering alternative or combined recognition features for the system (Maes: column 9, lines 42-43).

As per **claim 3** (depending on claim 1), Porter in view of Maes further discloses adding to the strength of the frequency component in the test signal, (Porter: column 7, lines 48-49, 'use "power add" result in constructing various models', which is applicable for the test signal; column 9, lines 31-32, 'modify the data by adding noise appropriated

to current condition, using the power add', Fig. 1A, when switch 13 on 'Modify Templates', the process can be used for test signal).

As per **claim 4** (depending on claim 1), Porter in view of Maes further discloses that adding to the strength of the frequency component in one of the test signal or training signal does not change the variances of the frequency component in the test signal and the training signal, (Porter: column 7, lines 48-49, 'use "power add" result in constructing various models', which is applicable for the training signal; Fig. 1A, when switch 13 on 'Modify Templates', the process can be used for training signal).

As per **claim 21**, Porter discloses apparatus and methods for the selective addition of noise to templates employed in automatic speech recognition systems (title), comprising:

receiving a training speech signal (Figs. 1A and 1B, functional block 12 'spectrum analyser', the path of 'form templates' or the path of 'modify templates');

receiving a test speech signal (Figs. 1A and 1B, functional block 12 'spectrum analyser', the path of 'modify templates' or the path of 'recognition');

adding to the strength of at least one frequency component across the entirety of one of the training speech signal or test speech signal in the production of a matched training speech signal and a matched test speech signal such that the mean strength of the frequency component in noise in the matched training speech signal is the same as the mean strength of the frequency component in noise in the matched test speech signal (column 4, lines 10-21, 'spectral magnitude values (strength of the frequency component)'; column 5, line 15 to column 6, line 54 and Figs. 1A and 1B, 'spectral parameter' (also interpreted as strength of the frequency component), 'selectively adds

noise to form templates', 'modify (including "add to") the spectral templates (corresponding to training signal) as formed in module 164', 'templates ...are modified by the selective addition of noise via the estimated noise statistic generator'; column 8, lines 18-21, 'by modifying noise-free or relatively noise-free templates so that they are the same (inherently including the same mean strength) "as if" they had been made from noisier speech');

generating a model from the matched training speech signal (column 5, lines 47-49, 'the Form Template Mode' 'provides spectral form of templates to obtain template parameters which template parameters are then utilized to form templates (models); Figs. 1A and 1B, function blocks 'templates for no noise' and 'templates for use with noise');

comparing the matched test speech signal to the model (Figs. 1A and 1B, function block 'recognition algorithm').

But, Porter does not expressly disclose comparing "the model to identify the speaker". However, this feature is well known in the art as evidenced by Maes who discloses generating log-likelihood of feature vectors and mean and variance (column 8, lines 52-55), and using a model selection 342 for speech or speaker recognition (inherently including identify speaker) (column 9, lines 6-7 and 44-55). Therefore, it would have been obvious to one of ordinary skill in the art at time the invention was made to modify Porter by specifically providing a model for speaker recognition, taught by Maes, for the purpose of offering alternative or combined recognition features for the system (Maes: column 9, lines 42-43).

As per **claim 29**, Porter discloses apparatus and methods for the selective addition of noise to templates employed in automatic speech recognition systems (title), comprising:

a spectral addition component (Figs. 1A and 1B, combination of functional blocks 12, 14, 162, 164 and 166) for adding to the strength of a frequency component in at least one of the test signal or training signal to produce a matched test signal and a matched training signal such that the mean and variance of the strength of the frequency noise in the matched are respectively equal the mean and variance of the strength of the frequency component in noise in the matched test signal, (column 4, lines 10-21, 'spectral magnitude values (strength of the frequency component)'; column 5, line 15 to column 6, line 54, 'spectral parameter' (also interpreted as strength of the frequency component), 'selectively adds noise to form templates', 'modify (includes adding) the spectral templates (corresponding to training signal) as formed in module 164', 'templates ...are modified by the selective addition of noise via the estimated noise statistic generator'; column 9, line23, 'measuring the average (mean) and the variance'; column 8, lines 18-21, 'by modifying noise-free or relatively noise-free templates so that they are the same "as if" they had been made from noisier speech', so that the mean and strength of the strength would also be the same "as if" they had been made from noisier speech, as claimed);

a trainer for training a recognition model (template) based on the matched training signal, (Fig.1A; either path of 'Form Templates' or path of 'modify templates' can be interpreted as training a recognition model, 'template for no noise' or 'templates for use with noise').

But, Porter does not expressly disclose the trainer stated above is "for training a **speaker recognition model**" and "a decoder [capable of generating probability] for an identity of speaker based on matched test signal", wherein "capable of ..." is not positive limitation so that no patentable weight is given for the limitation. However, this feature is well known in the art as evidenced by Maes who discloses using probabilistic distance which is the log-likelihood of feature vectors and having mean and variance (column 8, lines 52-55), and using a model selection 342 for speech or speaker recognition (inherently including a speaker recognition model and an identity of speaker) (column 9, lines 6-7 and 44-55). Therefore, it would have been obvious to one of ordinary skill in the art at time the invention was made to modify Porter by specifically providing a speak recognition model and an identity of speaker, taught by Maes, for the purpose of offering alternative or combined recognition features for the system (Maes: column 9, lines 42-43).

6. Claim 2 is rejected under 35 U.S.C. 103(a) as being unpatentable over Porter in view of Maes as applied to claim 11 above, and further in view of Seydoux et al. (US 6,263,216), hereinafter referenced as Seydoux.

As per **claim 2** (depending on claim 1), Porter in view of Maes further discloses:

determining the mean strength of the frequency component of noise in the training signal (Porter: column 5, lines 45-46, 'templates (herein corresponding to the training signal), as stored in model 16... were generated for a no noise condition', which indicates a zero mean of the noise strength in the templates; also see Figs. 1A and 1B);

determining the mean strength of the frequency component of noise in the test signal (Porter: column 9, lines 63-66, 'measuring (determining) the average (mean) ...at the output of the bandpass filter channel (corresponding to frequency component)', 'expected value (mean)'); and

to determine a value to add during the step of adding to the strength of the frequency component in one of the test signal or training signal (Porter: column 8, lines 32-62, 'power add', 'Base Form templates combined with (added) the current average noise power');

But, Porter in view of Maes does not expressly disclose using "subtracting the mean strength of noise in the training signal from the mean strength of noise in the test signal". However, the concept of subtracting a mean value of noise from a signal is well known in the art as evidenced by Seydoux who discloses that during voice recognition mode, for each frame and in each band, the estimated mean noise is subtracted from the previously calculated maximum (column 6, lines 19-21). Therefore, it would have been obvious to one of ordinary skill in the art at time the invention was made to modify Porter in view of Maes by specifically providing subtracting a mean value (such as energy, or power as used by Porter) from a signal, as taught by Seydoux, for the purpose of removing the background noise in a signal (Seydoux: column 5, lines 43-44).

7. Claim 15 is rejected under 35 U.S.C. 103(a) as being unpatentable over Porter in view of Maes, and further in view of Gong (US 6,577,997 B1).

As per **claim 15**, as best understood in view of the rejection under 35 USC 112 2nd (see above), Porter discloses apparatus and methods for the selective addition of noise to templates employed in automatic speech recognition systems (title), comprising:

receiving a training speech signal (Figs. 1A and 1B, functional block 12 'spectrum analyser', the path of 'form templates' or the path of 'modify templates');

receiving a test speech signal (Figs. 1A and 1B, functional block 12 'spectrum analyser', the path of 'modify templates' or the path of 'recognition');

generating a model from the matched training speech signal (column 5, lines 47-49, 'the Form Template Mode' 'provides spectral form of templates to obtain template parameters which template parameters are then utilized to form templates (models); Figs. 1A and 1B, function blocks 'templates for no noise' and 'templates for use with noise');

comparing the matched test speech signal to the model (Figs. 1A and 1B, function block 'recognition algorithm');

But, Porter does not expressly disclose comparing 'the model to identify the speaker". However, this feature is well known in the art as evidenced by Maes who discloses generating log-likelihood of feature vectors and mean and variance (column 8, lines 52-55) and using a model selection 342 for speech or speaker recognition (identify speaker) (column 9, lines 6-7 and 44-55). Therefore, it would have been obvious to one of ordinary skill in the art at time the invention was made to modify Porter by specifically providing a model for speaker recognition, taught by Maes, for the purpose of offering alternative or combined recognition features for the system (Maes: column 9, lines 42-43).

Further, even though Porter discloses a spectrum analyzer using spectral magnitude values (column 4, lines 10-21) and spectral parameters (column 6, lines 56-57) that correspond to a plurality of frequency components, and measuring the variance for a channel (corresponding to a frequency component) with noise (column 9, lines 23-26), Porter in view of Maes does not expressly disclose that "for each of a plurality of frequency components **adding to (adjusting) the variance** of the frequency component in one of the training speech signal or test speech signal so that the variance of the frequency component of noise in a matched training speech signal matches the variance of the frequency component of noise in a matched test speech signal". However, this feature is well known in the art as evidenced by Gong who discloses system and method of noise dependent classification (title), comprising using variance matrix adjusted to compensate the detected noise level (column 9, lines 56-57). Therefore, it would have been obvious to one of ordinary skill in the art at time the invention was made to modify Porter in view of Maes by specifically providing adjusting variance(s), taught by Gong, for the purpose of compensating the detected noise level (Gong: column 9, lines 56-57), so that a frequency component variance of noise in one signal can be adjusted to match another corresponded variance of noise in a different signal.

8. Claims 6 and 22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Porter in view of Maes as applied to claims 1 and 21 above, and further in view of Hwang et al. (US 6,449,594 B1) hereinafter referenced as Hwang.

As per **claim 6** (depending on claim 1), Porter in view of Maes does not expressly disclose "adding to the strength of the frequency component in one of the test signal or

training signal **does not change the variances** of the frequency component in the test signal and the training signal". However, this feature is well known in the art as evidenced by Hwang who discloses method of model adaptation for noisy speech recognition by transformation between cepstral and linear spectral domain (title), comprising adapting (adding to) the mean vectors without adjusting the variance (column 3, lines 36-37). Therefore, it would have been obvious to one of ordinary skill in the art at time the invention was made to modify Porter in view of Maes by specifically providing adapting a mean value without adjusting the variance, as taught by Hwang, for the purpose of performing adaptation process with a relatively low computation amount (Hwang: column 3, lines 48-49).

As per **claim 22** (depending on claim 1), Porter in view of Maes further discloses:

determining the mean strength of the frequency component of noise in the training signal (Porter: column 5, lines 45-46, 'templates (herein corresponding to the training signal), as stored in model 16... were generated for a no noise condition', which indicates that an equivalent zero mean of the noise strength in the templates can be determined; also see Figs. 1A and 1B);

determining the mean strength of the frequency component of noise in the test signal (Porter: column 9, lines 63-66, 'measuring (determining) the average (mean) ...at the output of the bandpass filter channel (corresponding to frequency component)', 'expected value (mean)');

determining the difference between the mean strength in noise in the training speech signal and the mean strength in noise in the test speech signal (Porter: column 5, lines 45-46 and Porter: column 9, lines 63-66, as stated above, since one of the mean is

zero the difference between the two means can be simply determined by the second mean);

adding the difference to the strength of the frequency component in one of the training speech signal or test speech signal.

But, Porter in view of Maes does not expressly disclose "adding the difference (mean difference) to the strength of the frequency component in one of the training speech signal or test speech signal". However, this feature is well known in the art as evidenced by Hwang who discloses method of model adaptation for noisy speech recognition by transformation between cepstral and linear spectral domain (title), comprising adapting the mean (necessarily including adding mean) vectors (column 3, lines 36-37). Therefore, it would have been obvious to one of ordinary skill in the art at time the invention was made to modify Porter in view of Maes by specifically providing adapting a mean value, as taught by Hwang, for the purpose of performing adaptation process with a relatively low computation amount (Hwang: column 3, lines 48-49).

Allowable Subject Matter

9. Claims 5, 7-14, 16-18, 20 and 23-28 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims, and further fixing all corresponding problems regarding USC 112 2nd rejection, as stated above.

The following is an examiner's statement of reasons for allowance:

Regarding **claim 5** (depending on claim 1), the prior art of record fail to specifically disclose or fairly suggest the method speaker recognition including distinct

features of: generating a matched test signal (in terms of matching mean and/or variance of noise portion in the signals) and a matched training signal by performing steps for each of a plurality of frequency components comprises:

adding to (increasing in spectral domain) the strength (amplitude, energy, power) of the frequency component in one of the test signal or the training signal, as part of the production of the matched test signal and the matched training signal, so that the mean strength of the frequency component in the noise of the matched signal equals (matches) the mean strength of the frequency component in the noise of the matched test signal (inherited from claim 1); and

wherein for some frequency components the step of adding to the strength of the frequency component in one of the test signal or training signal comprises adding to the strength of the frequency component in the training signal and for other frequency components the step of adding to the strength of the frequency component in one of the test signal or training signal comprises adding to the strength of the frequency component in the test signal.

Regarding **claim 7** (depending on claim 1), the prior art of record fail to specifically disclose or fairly suggest the method speaker recognition including distinct features of: generating a matched test signal (in terms of matching mean and/or variance of noise portion in the signals) and a matched training signal by performing steps for each of a plurality of frequency components comprises:

adding to (increasing in spectral domain) the strength (amplitude, energy, power) of the frequency component in one of the test signal or the training signal, as part of the production of the matched test signal and the matched training signal, so that the mean

strength of the frequency component in the noise of the matched signal equals (matches) the mean strength of the frequency component in the noise of the matched test signal (inherited from claim 1); and

increasing the variance of the frequency component in one of the test signal or the training signal, as part of the production of the matched test signal and the matched training signal, so that the variance of the frequency component in the noise of the matched training signal equals (matches) the variance of the frequency component in the noise of the matched test signal.

Regarding **claims 8-14**, they are dependent on claim 7 so that they inherit all limitations from their parent claim(s).

Regarding **claim 16** (depending on claim 15), the prior art of record fail to specifically disclose or fairly suggest the method speaker recognition including distinct features of: for each of a plurality of frequency components adding to the variance of the frequency component in one of the training speech signal or test speech signal so that the variance of the frequency component of noise in a matched training speech signal matches the variance of the frequency component of noise in a matched test speech signal (inherited from claim 15); wherein, adding to the variance of the frequency component comprises:

identifying a series of strength values for the frequency component in a segment of noise taken from one of the training speech signal or the test speech signal;

finding the mean of the series of strength values;

subtracting the mean from each strength value in the series of strength values to generate zero-mean strength values;

multiplying the zero-mean strength values by a gain factor to produce a variance pattern; and

adding the variance pattern to each segment of one of the training speech signal or the test speech signal.

Regarding **claims 17**, they are dependent on claim 16 so that they inherit all limitations from their parent claim(s).

Regarding **claim 18** (depending on claim 15), the prior art of record fail to specifically disclose or fairly suggest the method speaker recognition including distinct features of: for each of a plurality of frequency components adding to the variance of the frequency component in one of the training speech signal or test speech signal so that the variance of the frequency component of noise in a matched training speech signal matches the variance of the frequency component of noise in a matched test speech signal (inherited from claim 15); and

for each of a plurality of frequency components, adding to the frequency component of one of the test speech signal or the training speech signal so that the mean strength of the frequency component **of noise** (bold phrase is added be examiner, based on the best understood in view of contexts of the claim(s) and the specification) in the test speech signal is matched to the mean strength of the frequency component **of noise** in the training speech signal.

Regarding **claim 20** (depending on claim 15), the prior art of record fail to specifically disclose or fairly suggest the method speaker recognition including distinct features of: for each of a plurality of frequency components adding to the variance of the frequency component in one of the training speech signal or test speech signal so that the

variance of the frequency component of noise in a matched training speech signal matches the variance of the frequency component of noise in a matched test speech signal (inherited from claim 15); and

receiving a second training speech signal; wherein adding to the variance of a frequency component in one of the training speech signal or test speech signal comprises:

identifying the largest variance in the test speech signal, the training speech signal and the second training speech signal; and

adjusting the variance of the test speech signal, the training speech signal and the second training speech signal to match the largest identified variance.

Regarding **claim 23** (depending on claim 21), the prior art of record fail to specifically disclose or fairly suggest the method speaker recognition including distinct features of: adding to the strength of at least one frequency component across the entirety of one of the training speech signal or test speech signal in the production of a matched training speech signal and a matched test speech signal such that the mean strength of the frequency component in noise in the matched training speech signal is the same as the mean strength of the frequency component in noise in the matched test speech signal (inherited from claim 21); and

selectively adding to the strength of the frequency component in one of the training speech signal or test speech signal in further production of the matched training speech signal and the matched test speech signal such that the variance of the strength of the frequency component of noise in the matched training speech signal is equal to the variance of the strength of the frequency component of noise in the matched test speech signal.

Regarding **claims 24-28**, they are dependent on claim 23 so that they inherit all limitations from their parent claim(s).

The prior art, Porter (US 4,933,973), Maes (US 5,930,749), Seydoux et al. (US 6,263,216), Gong (US 6,577,997 B1), Hwang et al. (US 6,449,594 B1), of record provided numerous teachings or alternative approach for speech and speaker recognition with noise, including generating background noise models, spectral domain analysis, measuring the average (mean) and variance of a signal, estimating noise statistical properties, selective addition of noise, adding and subtracting mean, modifying noise speech. However, the features as presented above are not anticipated by, nor made obvious by the prior art of the record.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

Conclusion

10. Any response to this action should be mailed to:
    Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450
    or faxed to:
    (703) 872-9306, (for formal communications intended for entry)
    Or:
    (703) 872-9306, (for informal or draft communications, and please label "PROPOSED" or "DRAFT")

Patent Correspondence delivered by hand or delivery services, other than the USPS, should be addressed as follows and brought to U.S. Patent and Trademark Office, 220 20th Street S., Customer Window, Crystal Plaza Two, Lobby, Room 1B03, Arlington, VA, 22202

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Qi Han whose telephone numbers is (703) 305-5631. The examiner can normally be reached on Monday through Thursday from 9:00 a.m. to 7:00 p.m. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Richemond Dorvil, can be reached on (703) 305-6954.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Inquiries regarding the status of submissions relating to an application or questions on the Private PAIR system should be directed to the Electronic Business Center (EBC) at 866-217-9197 (toll-free) or 703-305-3028 between the hours of 6 a.m. and midnight Monday through Friday EST, or by e-mail at: ebc@uspto.gov. For general information about the PAIR system, see http://pair-direct.uspto.gov.

QH/qh
September 7, 2004

Richemond L. Dorvil
PATENT EXAMINER
AU 2654

Application/Control No.	Applicant(s)/Patent Under Reexamination
09/685,534	HUANG ET AL.

Notice of References Cited

Examiner	Art Unit	Page 1 of 1
Qi Han	2654	

U.S. PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Name	Classification
	A	US-4,933,973	06-1990	Porter, Jack E.	704/233
	B	US-5,930,749 A	07-1999	Maes, Stephane Herman	704/228
	C	US-6,263,216 B1	07-2001	Seydoux et al.	455/564
	D	US-6,577,997 B1	06-2003	Gong, Yifan	704/252
	E	US-6,449,594 B1	09-2002	Hwang et al.	704/233
	F	US-6,445,801 B1	09-2002	Pastor et al.	381/94.2
	G	US-			
	H	US-			
	I	US-			
	J	US-			
	K	US-			
	L	US-			
	M	US-			

FOREIGN PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Country	Name	Classification
	N					
	O					
	P					
	Q					
	R					
	S					
	T					

NON-PATENT DOCUMENTS

*		Include as applicable: Author, Title Date, Publisher, Edition or Volume, Pertinent Pages)
	U	

*A co... his Office action. (See MPEP § 707.05(a).)
Dates ...ssifications may be US or foreign.

U.S. P...
PTO-